Remarks

Preliminary Matters

No Claims have been cancelled. No Claims have been added. No additional fees are required. If determined otherwise, the Office is authorized to charge Deposit Account No. 07-1077 for the amount.

Two persons have signed this Amendment and Response, representing their respective inventors. For convenience of the Office, one postal address is provided, but otherwise, the two attorneys' information are differentiated.

Information Disclosure Statement

Applicants will appreciate receiving acknowledgement by the Office, for the record, of review of the references included in the Information Disclosure Statement concurrently submitted.

§ 102 Rejection

The Office has rejected all Claims 1-20 as anticipated by U.S. Pat. Appln. Publication No. 2002/0156171 A1 (Drewniak et al.)

The amendments to Claim 1, from which all other Claims depend, directly or indirectly, overcomes this rejection.[1] Support for the amendment is found in the Specification at pages 9-11 with respect to Examples 5-16 which have a nanoclay concentration of 8% in the nanocomposite, all with a weight ratio of nanoclay to compatibilizing dispersion agent of 4:1 as seen in Examples 1-4. Example 35 also supports the "at least" nature of the amendment because the nanoclay concentration is 12% with a weight ratio of nanoclay to compatibilizing dispersion agent also of 4:1.

Drewniak et al. is deficient as a reference as follows:

Example 12 of Drewniak et al. has a ratio of clay to dispersant of 2:1. That is as large a ratio of clay to dispersant as Drewniak et al. teaches successfully.

[1] It should also be noted that the Office in Paragraph 4 of the Office Action rejected the same Claims 1-20 as unpatentable for obviousness using the same reference. Therefore, for that rejection to be proper, there must have been some deficiency in the anticipation of Claims 1-20 by that reference. Regardless, the amendment overcomes both anticipation and obviousness by that reference.

Claim 1 of the present application, as amended, has a ratio of 3.1:1 -- 10:1.

It should be noted that Claim 1 of Drewniak et al. by extrapolation of the extremes of the two weight percents offers a potential range of clay to dispersant of 50:1 to 1:10, but the proper teaching of Drewniak et al. resides in Paragraphs 0015 -- 0024 of Drewniak et al., read in conjunction with the Examples 1-12.

It should be noted that Paragraph 0015 states the absurd extremes of Claim 1 of Drewniak et al. without any demonstration of that performance possibility in the examples of Drewniak et al. Paragraphs 0016 - 0024 are not any better.

The ratios of clay to dispersant in the examples of Drewniak et al. are:

Example 1 -- 1:4
Example 2 -- 4:3
Example 3 -- 4:2
Example 4 -- 4:2
Example 5 -- 4:2
Examples 6-8 -- 4:3
Example 9 -- 4:3
Examples 10 -11-- 4:2
Example 12 -- 4:2.

Nowhere in the Examples of Drewniak et al. is there any demonstration of successful blending of a nanocomposite with a ratio of clay to dispersant of more than 2:1. Applicants in their Examples 1-4 demonstrate successful preparation of nanoclay concentrates having a ratio of clay to dispersant of 4:1. Examples 5-16 show at least 8% nanoclay concentration in the nanocomposite, with documented performance of physical properties that demonstrate excellent dispersion of clay in the nanocomposite. Please see Table 3 as continued at the top of page 11 of the specification, and particularly with respect to flexural modulus and stress at yield. Of Examples 5-16, Examples 5, 9, and 13 showed an excellent balance of stiffness and toughness, the *sine qua non* of thermoplastic engineered material performance properties.

Also, Example 35 shows both a ratio of clay to dispersant of 4:1 and at least 8% nanoclay concentration in the nanocomposite, along with documented performance. Please see Table 8 on page 15 of the specification.

Simply put, Drewniak et al. can not be considered a valid reference for anything other than it has *proven* to work. In this chemistry, the intercalated nanoclay is quite difficult properly disperse well into the plastic matrix. The compatibilizing dispersing agent is needed, but no one until Applicants were successful in using so little dispersant (>3.1:1) compared with so much clay (8%).

§ 103 Rejection

Notwithstanding the statement of Paragraph 0015 of Drewniak et al., there is nothing from Drewniak et al. that renders Applicants' Claim 1 obvious. As stated above, working with ingredients that have at least one dimension in the nanometric order of magnitude makes nothing straightforward or obvious.

Also as stated above, the hard reality was that Drewniak et al. might have speculated as applicants often do, but the proof of what Drewniak et al. could make falls 100% short of what Applicants have accomplished.

It should also be noted that Applicants have proven their 8% clay concentration and >3.1:1 clay: dispersant numerical requirements in their Claim 1 both in a concentrate + dilution-to-compound environment (Examples 1-4 + Examples 5-16) and in a direct compounding environment (Example 35). Therefore, the success that Applicants have had with actual chemistry experiments that Drewniak et al. could only dream about is proof of unobviousness.

There is nothing in Drewniak et al. that suggested to one of ordinary skill in the art that one *even could* move past a ratio of 4:2 clay to dispersant. Any one of *ordinary* skill in the art would have turned to the examples to see what Drewniak et al. *actually did* in the examples.

Working with at least 8 weight percent and a ratio of clay to dispersant of more than 3.1:1 was *beyond the horizon* of whatever Drewniak et al. themselves could prove to themselves and the art, when they filed their patent application. Paragraph 0018 of Drewniak et al. does include the *possibility* of a 4:1 ratio of clay to dispersant but at only 4% concentration of clay in the compound. The latter half of Paragraph 0018 also includes the *possibility* of a 10:2 ratio of clay to dispersant, but that combination, if true, would have been exemplified with actual data to prove they

exceeded in making a nanocomposite well beyond anything anyone had done previously. Even Drewniak et al. were not motivated to prove to scientific certainty an ratio of clay to dispersant of greater than 2:1.

Finally, it needs to be noted that the present invention exceeds anything previously seen possible by even two of the four inventors of this patent application. With care, the ratio of at least 3.1:1 was selected for Claims 1-20 because inventors Qian and Lan only were able reach 3:1 as seen in their published application US2001/0033924, Qian et al., now of record. Please see Examples 3-14, in which the maximum clay to dispersant ratio stated is 3:1.

If anything, Drewniak et al. (October 24, 2002) represents a *regression* in the art from Qian et al. (October 25, 2001) in this rapidly emerging nanotechnology. But no one, even two of the inventors here, proved it possible to obtain excellent polymer properties from a concentration of clay of at least 8 weight percent and a ratio of clay to dispersant of from 3.1:1 to 10:1. Applicants and their Assignees are entitled to the grant of a patent for their breakthrough effort, not known or obvious to their contemporaries in the art.

Conclusion

Applicants's Claims 1-20 are patentable over Drewniak et al. and other references of record. Applicants and their respective Assignees request a Notice of Allowance.

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